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RANGE IMPROVEMENT



U. S. DEPT. OF AGRICULTURE
NATIONAL FOREST SERVICE
MAY 1 1968
DAVIS, CALIF. REGION

VOL. 13, NO. 2

NOTES

APRIL 1968

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FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "NOTES" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.



ROLLING TWISTED ANCHOR CHAIN FOR CONTROL OF BIG SAGE

Written By

Allen C. Elliott in collaboration with
Jack Crowder and George Knoll*

The 740,000-acre Jicarilla Apache Indian Reservation lies in northwestern New Mexico approximately 90 miles east of Farmington. The northern boundary is the New Mexico-Colorado line and the reservation extends southward for about 70 miles and at its widest point is about 25 miles. The Continental Divide bisects much of the north-south length of the reservation.

The general climate is mild and dry. Annual precipitation varies over the reservation from 12 inches in the southernmost point to more than 18 inches along the Continental Divide in the northern part of the reservation. The elevation varies from about 6,400 feet in the south to more than 8,900 feet on the higher mesas of the north.

The tribe, with technical assistance of the Bureau of Indian Affairs, Branch of Land Operations, has controlled big sage in the north half or summer range areas of the reservation on more than 60,000 acres by plowing and seeding to standard crested wheatgrass.

Periodic efforts have been made during this same period to find an economical way to control big sage in the south half of the reservation, which is used primarily as winter range for sheep. Rotary beaters, railroad irons, and various other methods have been tried to control sagebrush on the winter range area. Some excellent control has been obtained by some of these methods; the cost per acre, however, has been prohibitive. There is an area on the reservation of approximately 200,000 acres of big sage with a good understory of native grasses that will lend itself to this kind of control.

In early April of 1967 a Conservation Contractor, Mr. Jack Crowder of Bernillio, New Mexico, employed by the Jicarilla Apaches, and Mr. E. N. Holm, Soil Conservationist, were demonstrating the use of anchor chain

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Mr. Jack Crowder is a Conservation Contractor from Bernillio, New Mexico.

Mr. George Knoll, Range Scientist, for the Albuquerque Area Office of the Bureau of Indian Affairs, Albuquerque, New Mexico, made the technical investigations as to range conditions and production increases.



for control of big sage in the winter range area of the reservation to the Rio Arriba County Agricultural Stabilization Conservation Office Manager, Mr. Fred Romero, and some of the State and County ASC committeemen. As the tractors made a turn, the group observed that as the chain rolled on the turn it seemed to kick the sagebrush out of the ground. From this beginning, an idea was born in the mind of the contractor. Why not make the whole length of this chain roll as it was drawn between two D-9 Caterpillar tractors? The following paragraphs are the comments of Mr. Crowder on this point:

One windy day when a group was inspecting our project we made a discovery. The tractors turned around and caused a short section of the chain to roll. As it rolled we noticed it pulled on the sagebrush but didn't drag it along. The grass remained largely undisturbed.

Soon we were rolling the entire hitch (our name for the device between the two tractor drawbars). We made swivels from heavy oil well tool joints. These first swivels had no bearings and the metal-to-metal contact points soon gave trouble. The chain weight total at this point was about 54,000 pounds - 540 feet of 57-pound chain and 540 feet of about 44-pound chain. One swivel was placed 90 feet behind each tractor. A single rigid chain pulled straight back from the tractor to the swivel. The entire 540-foot loop of double chain rolled.

The swivels worked for a few hours, then began to seize and lock up. We discovered that the chain wouldn't roll at all when the tractors were close together. As they widened the shape of the chain changed from a narrow "U" shape to a wide half moon. Using defective swivels made it necessary to widen to make the chain roll. Finally we had to widen until we could not steer the tractors. This is a common chaining problem - each tractor steering the other to the outside. When we narrowed, the chain wouldn't roll, and not rolling, it began carrying the brush along again. We tried to grease the hot swivels and the grease ignited. More white hair!

Swivels were made from used Allis Chalmers tractor rollers. These rollers were selected because they have a tapered timken bearing, are lifetime lubricated, and more important, have a built-in thrust capability. Used rollers were purchased for \$25 each and welding and materials to make them easily connected to the chain cost another \$65 each. One-inch plate was used to make flanges, and holes were cut in the plate to accommodate a 2-inch diameter pin. Arc welding was done slowly, using small rod to avoid overheating the seals in the rollers.



These swivels worked very well. We pulled 1,336 acres of sage in 36 hours, rolling the double chain and got a good kill, leaving most of the native grass.

To clarify Mr. Crowder's statement that "the chain was doubled together" was not that they were doubled but that they were wound around each other, or twisted together.

Mr. Crowder indicated that, to date the most efficient length of chain was 540 feet of 57-pound chain wrapped with 540 feet of 44-pound chain pulled between two D-9 tractors hooked to a swivel on each end of the twisted section by about 90 feet of single chain behind each tractor (pull the sagebrush two ways, up and right back in the opposite direction). The County and State ASC Committees, after observing the results of this practice, have approved it in their handbook under the railing practice since our percent of kill exceeded the minimum requirements of the ASC or averaged more than 90 percent of kill under the best condition. Most of the sage was flipped out of the ground and many of the plants that were not flipped out were so shattered at the ground line and below that they died within a week or two after the operation. The total cost per acre of \$2 is by far the most economical way we have found to control sagebrush by mechanical means. This may vary with the size of the job and the terrain. Under the conditions described in this paper, the understory of native grasses appeared to have suffered very little permanent damage although at the time much of the area appeared to be fresh plowed. The understory is predominately blue gramma with minor amounts of galleta, sand dropseed, Indian ricegrass and others, with about 30 to 40 percent of big sagebrush.

Before treatment, most of the range sites were in high fair condition and treatable. They are primarily clayey sites with some sandy sites.

SUMMARY

On the Jicarilla Apache Indian Reservation, after ten months in which to observe the results, the following preliminary conclusions can be drawn as to the results of use of a rolling, twisted together, anchor chain. This practice should be done in the spring before new growth begins in the sagebrush. The best results appear to be obtained if the soil-moisture condition is dry. The kill appears to be greater if chaining is done during a season when very little precipitation is to be expected for several weeks. Our best results were on large areas of mature sagebrush with few obstructions. However, scattered pinon and juniper trees and fairly large loose rocks did not seem to impede the practice.



On treated areas sagebrush made up 30-40 percent of the total vegetation. Successful treatment to kill sage without undue disturbance of the under-story has increased the total production by about 25 percent in one season. The increase of usable forage for cattle was from 118 pounds per acre to 160-170 pounds per acre and for sheep from 131 pounds per acre to 160-170 pounds per acre.

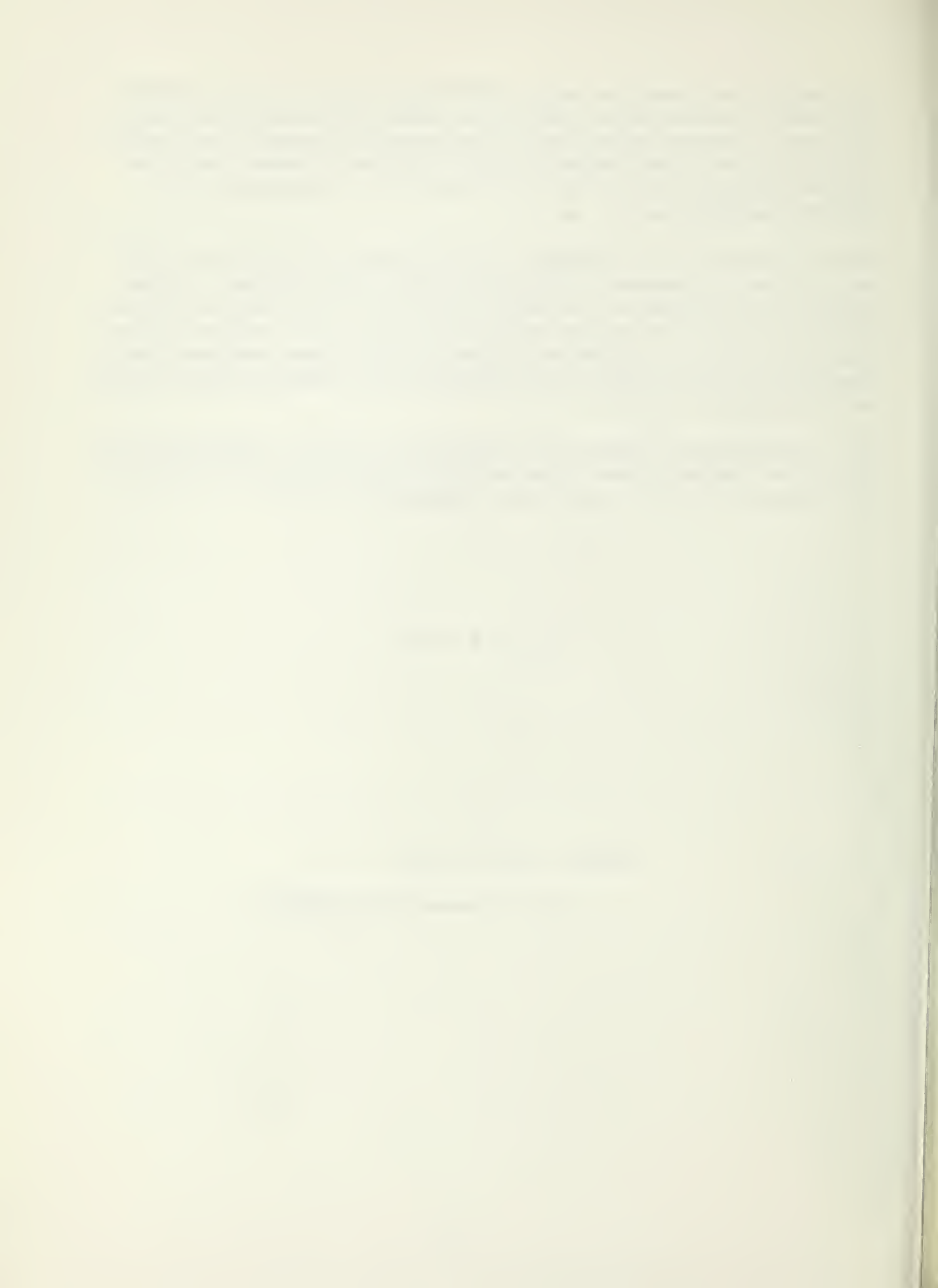
Much of the attached information is of a preliminary nature since sufficient time has not elapsed to fully evaluate the results of using a rolling chain to control big sage. The data to date on percent of kill is fairly accurate and really encouraging as are the costs per acre, but the information on the amount of usable forage production increases need much more observation and study before the full effect of this method of brush control can be properly evaluated.

The Jicarilla Apache Indians are observing this practice with a great deal of interest, and the Bureau of Indian Affairs staff at the Jicarilla Agency will continue to try to improve it and evaluate the results.

* * * * *

Famous LAST words

"I'm too smart for SAFETY!"



ANCHOR CHAIN SWIVELS

By

Donald R. Cain

The Ely District of the Bureau of Land Management tested several types of swivels in connection with use of the modified anchor chain.

The main principle of this type anchor chain is the rooting affect by the rails as the chain rolls in the direction of pull. Specially designed swivels, attached to each end of the chain are required to accomplish this rolling action. It has also been found that the addition of another swivel near the middle of the chain increases its effectiveness and ease of pulling. These swivels must be durable enough to withstand tremendous strain under extreme conditions.

Two standard type anchor chain swivels were used during the 1966 chainings. These swivels were unlubricated and became heated after 30-45 minutes of use. When this occurred, the cat operators were forced to stop chaining until the swivels cooled off, resulting in the loss of considerable time. Attempts at smearing shanks of the swivels with grease failed to keep them from heating. Wear on the shanks was extreme, due to the excessive friction and resultant heat produced.

At the start of the 1967 chainings, two self-aligning, sealed bearing swivels manufactured by a firm in Florida were tested. Their performance proved to be unsatisfactory. In fact, they lasted less than four hours before they became heated from excessive friction. This caused extreme wear on the shaft and cam surface, resulting in separation of the swivels. It was estimated that the stress placed upon these swivels was far below the bursting strength of 300,000 pounds specified by the manufacturer. The cost of these swivels was \$392 each.

As a replacement, two D-8 track rollers were modified for attachment to the chain and drawbars of the D-9 and D-7 Caterpillars. These rollers are bathed in oil, therefore, eliminating the problem of excessive heating. In the event, however, seals in the rollers are broken, a grease fitting can be used to fill the roller with a lubricant. The modified swivel weighs about 300 pounds, making attachment to the cats very difficult. For that reason, a short length of 40-pound link anchor chain was attached between the swivels and the cats to simplify hook-up and eliminate a need for lifting the swivels. Performance of the swivels was also increased by placing them a short distance behind the cats. The cost of these swivels including material and labor for modification, was \$177 each.

A third, unlubricated swivel manufactured by a firm in Florida, was placed along the chain near the loop of the "J" where it was under little stress. As

THE HISTORY OF THE CITY OF BOSTON

FROM THE FIRST SETTLEMENT TO THE PRESENT TIME
BY SAMUEL JOHNSON

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a result, heating and wear to the swivel were kept to a minimum. With the addition of this swivel, there was less tendency of the chain to drag and bind. The cost of this swivel was \$109.

CONCLUSION

The use of swivels is mandatory when pulling the modified anchor chain.

Swivels constructed of D-8 track rollers proved to be far superior to any tested for attachment of the chain to the Caterpillars.

The most inexpensive type of lubricated swivel can be made from a D-8 track roller.

The use of a small length of 40-pound link chain simplified the hook-up of the swivels to the Caterpillars.

The addition of a standard swivel near the loop of the "J" increased effectiveness and ease of pulling.

* * * * *

A fool and his money are soon parted.

After all, he's no better than the rest of us.

COW COUNTRY, October 1967



PROGRESS IN CHEMICAL CONTROL OF GAMBEL'S OAKBRUSH RANGELANDS

Robert W. Marquiss
San Juan Basin Experiment Station
Hesperus, Colorado

Gambel's oakbrush (Quercus gambelii) covers several million acres of foothill rangeland in Colorado and adjoining states. Attempts to control oakbrush on these rangelands are limited. Information on the chemical control of this species of oakbrush is deficient.

Studies were started in 1962 at the San Juan Basin Experiment Station to evaluate various herbicide treatments for oakbrush control. Use of 2, 4, 5-T and 2, 4, 5-TP has not given satisfactory control. Three successive annual folier applications of these herbicides is necessary for 60 to 95 percent crown kill. Spraying at the two-pound rate has been the most successful; greater rates have not increased crown kill. One to two years after these treatments, root sprouts were abundant. Where a high percentage of crown kill resulted, understory vegetation production was significantly increased, regardless of increased root sprouting. This increase of forage consisted of grasses, while forb production was decreased. Two aerial applications of these herbicides within a four-year period (1962 and 1966) have provided increased open grazing and fair to good control of the oakbrush.

Preliminary results with Tordon as a folier spray or granular application (beads and pellets) look promising. Several small plots with 100 percent crown kill and 100 percent root sprout control have been obtained with Tordon applications. Root sprouts observed in these plots three years after applications of Tordon beads did not survive the growing season. Grasses are abundant in Tordon bead plots and show no symptoms of damage from rates up to 4.5 pounds (a e. /acre). Tordon has been the only chemical used giving satisfactory root sprout control.

First-year treatments with Tordon at lower rates in combination with 2, 4-D, 2, 4, 5-T and 2, 4, 5-TP were made in 1966. Observations one year after application appear promising; however, evaluations of Gambel's oakbrush control one to three years after most treatments have been known to change considerably.

Bi-weekly soil moisture samples obtained in 1967 show the influence oakbrush may have on water storage. Gravimetric samples at one foot intervals to a depth of five feet were obtained from nontreated oakbrush and compared with samples from plots with 100 percent control. An average of approximately

five percent more moisture was obtained at the three- and four-foot depths of the 100 percent controlled plots during a mid-summer period when moisture percentages were the lowest.

Grazing results using yearling steers, indicate rangeland pastures with both sagebrush and oakbrush control produced 50 percent more pounds of beef per acre within one year after chemical application compared with a non-controlled native pasture. Only limited control of oakbrush has been obtained to date, but good control of other shrubby species has been obtained.

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The world is round

and the place which may seem like the end may

also be only the beginning.

Ivy Baker Priest

o o 0 o o 0 o o 0 o o

TRUTH has only to change a few times to become FICTION.

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY

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Literature of the
AMERICAN PRONGHORN ANTELOPE
By
James D. Yoakum*

ABSTRACT

This annotated bibliography with abstracts brings together 354 references on the taxonomy, life history, and management of the American Pronghorn Antelope (Antilocapra Americana Ord). Special emphasis was given to reports pertaining to food habits and range conditions as related to antelope biology and management. Included is literature from the earliest known publication on the Pronghorn dated 1723, to documents printed through December 1966.

The subject index lists the following three items regarding range improvements:

1. WATER DEVELOPMENTS: (Page 82) contains seven references to this subject. Reservoirs and spring developments are major water developments used on antelope ranges. Water catchments are increasing in numbers and use by Pronghorns.
2. FENCES: Some 24 references (Pages 69-70) are listed for this practice. The use of "sheep tight or woven wire fences" has been a highly controversial subject by managers on antelope ranges. Specifications for the "Rouse Fence" determined in 1954, Interstate Antelope Conference fence recommendations of 1962, and the more recent Spillet and Sill Fence Studies of 1963, are included.
3. RANGE IMPROVEMENTS: (Page 78) lists eight references pertaining to sagebrush manipulation (6), fencing (2), and water developments (2). The publications pertaining to sagebrush manipulations present some strong pro and con points regarding this technique on important antelope ranges.

Other indexed subjects such as food habits, livestock competition, range conditions, habitat, sagebrush, crop depredations, cattle, domestic sheep, density, nutrition, salt, water, weeds, and winter range provide data of interest and value to range and wildlife managers.

*Yoakum, J., 1967, Literature of the American Pronghorn Antelope, U. S. Bureau of Land Management, Reno, Nevada. 82 pp.

